

**PRIMARY SCIENCE CURRICULUM GUIDE
GRADE 4**

Unit 1: Human Body - Parts of the body and their roles for healthy living

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
The process of breathing	<p>Relate the movement of the ribcage to the process of breathing.</p> <p>Describe the movement of air during breathing.</p>	Observe movements of ribcage.	Display the ability to sit quietly and relax.	<p>Breathing consists of taking air into the lungs (inhaling) and expelling air from the lungs (exhaling).</p> <p>When inhaling, the ribcage in the region of the chest moves up and out. When exhaling the ribcage moves down and in.</p>	<p>1. Pupils use a balloon or paper bag and put it to their mouth as they breathe, observing what happens to the balloon/bag.</p> <p>3. Pupils relate results and observations on to the movement of air in breathing.</p> <p>4. Pupils sit quietly with eyes closed and concentrate on their breathing. They say how they feel in their nose as they breathe, then in their throat, and in their lungs.</p> <p>5. Pupils observe what happens to their ribcage as they breathe. They control their breathing, making each breath slower and deeper. They count their breaths to help them concentrate.</p> <p>6. Pupils report their observations during class discussion.</p>	<p>Balloon, paper bag Model Lung – See Appendix</p>	<p>Were pupils able to demonstrate the process of breathing?</p> <p>Were pupils able to relate the movement of their ribcage to breathing?</p> <p>Did pupils observe the demonstration using the model of the lungs?</p> <p>Were pupils able to sit quietly and relax when concentrating on their breathing?</p>	Health and Family Life Education – Concentration and Relaxation

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The respiratory system	Identify and name the main parts of the respiratory system. State the functions of the main parts of the respiratory system.	Make a simple drawing of the respiratory system.	Respect the beliefs and practices of others in using parts of animals. Display safety and hygienic practices when handling specimens	The main parts of the respiratory system are the nose, windpipe and lungs. The nose removes dust particles from the air. The windpipe takes air to the lungs which supply it to the blood.	7. Pupils use a model lung prepared by teacher to demonstrate what happens in the lungs. See Appendix. 1. Teacher/pupils provide a specimen of the windpipe and lungs of a mammal, e.g. sheep, goat or pig. 2. Pupils observe the available respiratory system. 3. Put a bicycle pump into a narrow section of the windpipe, or bronchus and inflate the lungs. 4. Pupils put the inflated lungs in water and squeeze it gently. 5. Pupils feel the inflated and deflated lungs. 6. On a large drawing of the human body, pupils put cut out parts of the respiratory system and match names of the parts to their functions. 7. Pupils make a simple drawing of the respiratory system.	Sheep, goat or pigs respiratory system, sharp knife, bicycle pump, bowl of water, rubber gloves, newspaper	Did pupils observe the mammalian respiratory system? Were pupils able to match parts of respiratory system to their functions? Did pupils draw and label the respiratory system correctly?	Physical Education - Breathing and Exercises Health and Family Life Education – Healthy Body Functions Art and Craft - Drawing

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The circulatory system	Identify and name the main parts of the circulatory system.	Observe the circulatory system. Label a simple diagram of the circulatory system.	Display safety and hygienic practices when handling specimens.	The circulatory system consists of the blood, heart, veins, arteries and capillaries.	<ol style="list-style-type: none"> 1. Teacher/pupils provide specimen of the heart and blood vessels of a mammal, e.g. sheep, goat or pig. 2. Pupils observe the available heart and blood vessels noticing their texture and elastic nature. 3. Pupils label a simple diagram of the circulatory system. <p><i>Note: Avoid details of heart chambers and body organs.</i></p>	Cow, pig or sheep heart, sharp knife, rubber gloves, Diagram of the circulatory system	<p>Did pupils observe the specimens provided?</p> <p>Were pupils able to label a diagram of the circulatory system?</p>	
	State the function of the circulatory system.		Appreciate the need to keep the heart healthy.	The circulatory system takes blood around the body. The heart pumps/ pushes the blood through the blood vessels to all the parts of the body.	1. Pupils suggest the function of the circulatory system (that is, to transport blood around the body) in light of their observations of the mammalian circulatory system.		Were pupils able to state the function of the circulatory system?	Health and Family life Education – Keeping the heart healthy

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			Demonstrate willingness to do things which help keep the heart healthy.	The blood transports nutrients and oxygen around the body. It is important to keep the heart healthy or we could suffer from heart diseases. Eating a balanced diet, exercising, being happy and avoiding tobacco and other harmful drugs help prevent heart diseases.	2. Pupils discuss the need to keep the heart healthy and prevent heart diseases. 3. Pupils discuss ways to keep the heart healthy.		Did pupils say why the heart should be cared for? Were pupils able to state three ways to prevent heart disease?	

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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The skeleton	Identify and name the main sections of the skeleton.	Observe skeletons.	Display good hygiene and safety practices in using parts of dead animals.	The main parts of the skeleton are the skull, ribcage, backbone, pelvis, and bones of the limbs, that is, the arms and legs.	<ol style="list-style-type: none"> 1. Teacher/pupils provide sections of the skeleton of common mammals. 2. Pupils observe available skeletons or sections of them. 3. Pupils attach labels to the sections of a large diagram of the human skeleton. 4. Cut up the large diagram into sections, pupils stick them together in the correct way. 5. Pupils play a game similar to 'Pin the Tail on the Donkey' where they stick the parts of the skeleton, and labels, onto the board with their eyes closed/wearing a blindfold? 	Large cardboard diagram of skeleton, pins/tacks/ tape. Skeleton or sections of skeleton of dog, rat, cow, or other mammals. Copies of simple drawing of the human skeleton	<p>Were pupils able to label the skeleton correctly?</p> <p>Were pupils able to put the skeleton together in the correct way?</p>	Physical Education – The skeleton

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					<p>6. Skeleton Jigsaw Teacher makes copies (photocopies) of the diagram of the human skeleton, about 20 cm long, on paper or cardboard for pupils to use in small groups or in pairs. Diagrams are cut into 'jig-saw' pieces at specific points such as the neck, shoulders, elbow, wrist, below ribcage, pelvis, hip, knee and ankle. Each set of pieces is mixed up and given to the pupils for them to arrange properly.</p>			

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The skeleton	<p>State the functions of the skeleton.</p> <p>Relate the structure of the parts of the skeleton to their functions.</p>	<p>Observe parts of the skeleton</p> <p>Record functions of skeleton.</p>	<p>Appreciate the need to care for the parts of the body.</p>	<p>The skull protects the brain, the ribcage protects the heart and lungs and aids breathing. The backbone helps support the body while protecting the spinal cord. The bones in the limbs are for movement.</p>	<p>1. Pupils say what would happen to their bodies if they had no bones.</p> <p>2.a) Pupils say what the internal organs feel like, e.g. soft.</p> <p>b) On a diagram of the human skeleton, pupils locate the position of internal organs in relation to the position of the skull and rib cage.</p> <p>c) Relate the position of these bones to their roles in protecting the organs inside.</p> <p>3.a) Pupils perform different actions such as standing, walking, jumping, and crouching and identify which sections of the skeleton are involved.</p> <p>b) Relate these actions to support and movement as provided by the skeleton.</p> <p>4. Pupils summarise the functions of the skeleton and record them in a table.</p>	<p>Large diagram of skeleton</p>	<p>Were pupils able to state the functions of the human skeleton?</p> <p>Were pupils able to complete the table by matching the parts of the skeleton to their functions?</p>	<p>Physical Education – The skeleton. Simple body exercises</p>

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Joints	Identify and name joints found in the body.	Observe movement of joints. Demonstrate functions of joints.	Appreciate the importance of joints.	A joint is where two or more bones meet. Some joints permit movement of the bones. Examples of joints are the shoulder, elbow, wrist, hip, knee, and ankle. Joints are flexible and allow for varied movement of the body and its parts.	1.a) Pupils perform a range of activities such as folding fists, touching shoulder, raising arm, or sing a song with actions involved (e.g. <i>‘One finger, one thumb, keep moving’</i> , or <i>‘This is the way we comb our hair’</i>). b) Pupils suggest what it is about the parts of their body which allows for such movements. 2. Pupils identify other parts of their body, that is, joints, where movement can occur. 3..Pupils identify and label joints on a diagram of the human skeleton. 4. Pupils discuss the importance joints.		Were pupils able to identify joints? Were pupils able to observe movement in different joints? Did pupils suggest why joints are important?	Physical Education – Types of joints. Flexibility exercises

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Unit 2: The Animal Kingdom– The variety, features and life processes of animals

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Features of vertebrates	Compare the external features of vertebrates.	Observe the external features of vertebrates. Classify animals based on features observed.	Demonstrate care and respect for animal life.	Vertebrates are animals with backbones. They have different external features which help us to group them. Their body coverings include skin, hair, fur, feathers and scales. Their limbs include legs, arms, wings and fins. The young are born alive or hatched from eggs.	1. Teacher and pupils bring some small vertebrates to class, e.g. dog, cat, bird, fish. <i>Pupils display due care, hygiene and safety in handling animals.</i> 2. Pupils observe features of available vertebrates and pictures of others. Pupils tell the class about the features observed. Where possible attention should be drawn to similarities and differences between vertebrates. 4. Working in small groups, pupils place animals into groups using the features observed. <i>Note: Pupils should decide on the animal groups for themselves.</i> 5. Pupils add other vertebrates that would fit into each group.	Samples of vertebrates, pictures of other vertebrates	Did pupils observe the different external features of vertebrates? Did pupils suggest groups into which the animals be placed? Did pupils display care, hygiene and safety in handling animals?	Mathematics - Sets

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Unit 2: The Animal Kingdom – The variety, features and life processes of animals

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Groups of vertebrates	Give examples of vertebrates from each group or class.	Observe differences and similarities among vertebrates. Classify vertebrates into five groups or classes. Research and present information on a selected animal.	Demonstrate care and respect for animals.	Vertebrates can be put into five groups or classes. These are, mammals, birds, reptiles, amphibians and fishes. Mammals have hair or fur, produce milk to feed their young, and are warm-blooded, e.g. humans, dogs, whales and bats. Birds have feathers and lay eggs. Reptiles have dry, scaly skin and lay eggs. Amphibians have smooth, wet skin, lay eggs in or near water and can live on land and in water.	1. Recall from previous lesson how animals can be grouped according to certain physical features. 2. Pupils work in groups of five or less. Provide pupils with descriptions of each vertebrate group or access to keys, pages 12 and 13 of Science Around Us Book 4. Provide pupils with samples/pictures/name cards of ten or more vertebrates. Pupils place these into groups, and when they have checked to see if they are correct, they copy the vertebrate group heading and the animals into their books. 4. Pupils add more animals to each group. Project Pupils work in groups of five or less. Each group chooses one animal, preferably from different vertebrate groups. The pupils research their chosen animal, make a poster and give a two-minute presentation.	Science Around Us, Book 4, Pictures/samples of vertebrates. Resources for research and presentation of project – magazines newspaper books, large paper, cardboard, colour markers.	Were pupils able to name at least two animals from each vertebrate group? Did each pupil contribute to the group project?	Mathematics - Sets

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Unit 2: The Animal Kingdom – The variety, features and life processes of animals

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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				Fishes live only in water, most have scales and lay eggs.	Pupils research the following: size, body covering, food, how the animals give birth, predators and prey.			

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Unit 3: The Plant Kingdom – The variety, features and life processes of plants

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
The needs of plants	State that plants need air and water to live.	<p>Predict what will happen to plants growing in different conditions.</p> <p>Manipulate simple equipment and materials in setting up experiments.</p> <p>Observe plants growing in different conditions of air and water.</p> <p>Record observations.</p>	Appreciate that plants are living things and have various needs.	Plants need air and water in order to live. They use air and water to help make food.	<p>1. Discuss the life processes of living things. Relate these to plants as living things.</p> <p>2. Pupils predict what plants need in order to live. (<i>Ensure that air and water are mentioned</i>).</p> <p>3. Pupils suggest ways of testing if plants actually need these things in order to live. <i>Note: If pupils suggest possible methods for testing what plants need, then let them carry out these tests.</i></p> <p>4. Tests/experiments should be similar to the following suggested procedure:</p> <p><i>Title: What do plants need in order to live?</i></p> <p>Pupils work in groups of 3 to 5.</p> <p><i>Lesson 1: Setting up experiment</i> <i>Observations: Made over about 2 weeks, 5 minutes each day. (Details below)</i></p> <p><i>Lesson 2: Making conclusions from observations (Details below)</i></p>	Each group will need the following: four potted plants of the same size and species, two plastic bags, two pieces of string, water	<p>Were pupils able to predict, giving reasons, what plants need?</p> <p>Were pupils able to suggest ways of testing what plants need?</p> <p>Were pupils able to set up experiments to carry out tests?</p> <p>Did pupils observe and record changes in plants over the course of the experiment?</p>	<p>Agricultural Science – Crop Growth</p> <p>Art and Craft – Drawing plants</p>

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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		Interpret results of experiments.			<p><i>Lesson 1</i> Pupils grow plants in four different conditions as follows; 1. Take four plants of the same size and species, growing in pots of the same size, and in the same type of soil. <i>Plant A</i> – Water and air. Water the plant every day.</p> <p><i>Plant B</i> – Water, no air. Cover the plant with a plastic bag (make sure it has no holes) and tie string tightly around the base of the stem to cut off air supply to the rest of the plant. Water every day the same as plant A.</p> <p><i>Plant C</i> – Air, no water Do not water this plant. Do not restrict the air supply.</p> <p><i>Plant D</i> – No water, no air Stop the plant getting air as you did for plant B. Do not water this plant.</p> <p>2. Pupils predict what will happen to each plant, giving reasons for their predictions.</p>		Were pupils able to make conclusions based on the observations and results of the experiment?	

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					<p><i>Observations</i></p> <ol style="list-style-type: none"> 1. Over the course of about two weeks, pupils observe daily each of the four plants. 2. They record observations in a table. 3. Pupils report their observations orally to the class. <p><i>Lesson 2, Conclusions</i></p> <ol style="list-style-type: none"> 1. Pupils compare the four different plants 2. They make conclusions <i>based on their observations and comparisons</i>, and say what plants need to live, according to the experiments. 3. Pupils compare the results with the predictions they made in Lesson 1, trying to explain any differences or unexpected results. 			

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Unit 3: The Plant Kingdom– The variety, features and life processes of plants

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Growth of plants	State the effects of light on plant growth.	<p>Predict how plants will grow in different conditions of light.</p> <p>Observe, measure and record growth in plants.</p> <p>Interpret results of tests on plant growth.</p>	Demonstrate care and respect for plant life.	Plants need light to grow. They will grow towards a source of light.	<p><i>Investigation: Do plants grow better in light?</i></p> <p>Pupils work in groups of 3 to 5.</p> <p><i>Lesson 1:</i> Setting up experiment</p> <p><i>Observations:</i> Made over about 2 weeks, 5 minutes each day.</p> <p><i>Lesson 2:</i> Summarising observations</p> <p><i>Lesson 1</i></p> <p>1. Pupils grow plants in three different conditions as follows.</p> <p><i>Plant A</i> – a place with lots of sunlight</p> <p><i>Plant B</i> – a place with little sunlight, e.g. under a table or behind a wall</p> <p><i>Plant C</i> – a dark place, e.g. in a box or cupboard</p> <p>2. Discuss the other conditions the plants are under and why these need to be kept the same for each set of plants.</p>	For each group, 3 plants of the same size and species, soil, pots, water, box Greenhouse (see Appendix)	<p>Were pupils able to make predictions (right or wrong) about the effects of light and temperature on plant growth?</p> <p>Were pupils able to measure and record the growth of plants?</p> <p>Were pupils able to state the effects of light and temperature on plant growth <i>using the results of their investigation?</i></p>	<p>Agricultural Science – Crop growth</p> <p>Mathematics – Measuring volume, graphs</p>

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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					<p>They should be kept at the same temperature, given the same amount of water, etc. 3.Pupils predict what will happen to the plants.</p> <p><i>Observations</i> 1. Pupils observe daily each of the three plants and record observations in a table. They should measure growth in an appropriate way – ask pupils for their ideas about the best ways to measure growth in the plants and use these. 2.Pupils report their observations orally to the class.</p> <p><i>Lesson 2, Conclusions</i> 1. Pupils put the results in a bar graph or line graph and compare the results for the three different plants. 2. They make conclusions <i>based on their observations</i> and say whether plants grow better when they have more light. 3.Pupils compare the results with the predictions they made in Lesson 1, explaining any differences or unexpected results.</p>			

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Growth of plants	State the effects of temperature on plant growth.	Observe and record growth in plants. Predict how plants will grow in different temperatures. Interpret results of experiments on plant growth.	Demonstrate care for plants.	Plants usually grow better in warm conditions.	<p><i>Investigation: Do plants grow better in warm places?</i></p> <p>Pupils work in groups of 3 to 5. <i>Lesson 1:</i> Setting up experiment <i>Observations:</i> Made over about 2 weeks, 5 minutes each day. <i>Lesson 2:</i> Making conclusions from observations.</p> <p><i>Lesson 1</i> 1. Pupils grow plants in three different conditions as follows.</p> <p><i>Plant A</i> – a very warm place, e.g. a greenhouse.</p> <p><i>Plant B</i> – a warm place, e.g. a window ledge.</p> <p><i>Plant C</i> – a cool or cold place,</p> <p>2. Discuss with pupils how and why you will keep the other conditions the same, i.e. the amount of water, light and space that the plants get.</p>	Potted plants of the same size and species	<p>Did pupils make predictions about how well plants would grow in different conditions?</p> <p>Were pupils able to measure plant growth accurately?</p> <p>Were pupils able to make graphs?</p> <p>Were pupils able to state the effects of changing temperature on plant growth?</p>	Mathematics – Measuring. Graphs

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					<p><i>Note: For the cold place you cannot put the plant in a dark fridge because it would get no light, and as you found out from the previous lesson, plants do not grow very well in dark places. Discuss this problem with the pupils and let them decide how they will set up a cool place which allows the plant to receive the same amount of sunlight as the other plants.</i></p> <p>3. Pupils predict what will happen to the plants in each of the three conditions.</p> <p><i>Observations</i> 1. Over the course of about two weeks, pupils observe daily each of the three plants and record observations in a table. They should measure growth in an appropriate way – ask pupils for their ideas about the best way to measure growth in the plants and use these suggested methods.</p>			

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Growth of plants					<p>2. Pupils report their observations orally to the class.</p> <p><i>Lesson 2, Conclusions</i></p> <ol style="list-style-type: none"> 1. Pupils put the results in a bar graph or line graph and compare the results for the three different plants. 2. They make conclusions <i>based on their observations</i>, and say if plants grow better in warmer places. 3. Pupils compare the results with the predictions they made in Lesson 1, trying to explain any differences or unexpected results. 			

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Parts of a leaf	Identify the main external parts of a leaf.	Observe external parts of leaves.	Demonstrate care and respect for plants.	<p>Leaves are thin, usually flat, green parts of plants that grow on the stem or straight up from the roots.</p> <p>Parts of a leaf are the stalk, the flat surface or blade, the veins, the margin or edge and the tip or apex.</p>	<p>1. Pupils collect a variety of leaves from home/schoolyard. <i>Ensure as little damage as possible is caused to plants.</i></p> <p>2. Pupils make leaf rubbings, leaf prints and drawings of leaves.</p> <p><i>Leaf rubbings</i> – place leaf under thin paper and gently rub over the paper with a wax crayon or coloured pencil.</p> <p><i>Leaf Prints</i>– dip leaf in ink/paint/dye and press leaf gently onto paper. Remove leaf.</p> <p>3. On the rubbing/print/drawing of their leaves pupils label the stalk, blade, veins, margin or edge and tip or apex. Draw attention to the differences between leaves in terms of size and shape of blade and pattern of veins.</p>	Leaves, wax crayons, colour pencils, paint/ink, trays, paper, newspaper to cover desks	<p>What effects did leaf rubbings and prints present?</p> <p>Were pupils able to identify and label the main parts of a leaf?</p>	<p>School Yard Ecology – Plant study</p> <p>Art and Craft – making prints rubbings and drawings of leaves.</p>

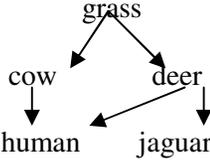
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Unit 4: The Environment – Components of the environment and their inter-relations

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Food webs	Construct simple food webs. Explain feeding relationships and name producers and consumers.	Manipulate equipment carefully in setting up and maintaining an aquarium. Observe feeding relationships between plants and animals.	Demonstrate care and respect for plant and animal life.	Living things depend on each other for food. When one living thing is eaten by another a food chain is formed. All food chains begin with plants which produce their own food and are called producers . Living things which eat other living things are called consumers . Consumers rarely depend on one type of food and often a particular food is eaten by more than one consumer, consequently food chains are connected at many points forming a food web .	1. Recreate a pond/trench aquarium in a large bottle or glass tank by putting pond/trench water in, then adding plants and animals found in ponds and trenches. 2. Pupils observe aquarium and suggest what each animal eats. They draw several food chains, e.g. pond weed → tadpole → tilapia pond weed → water beetle → patwa 3. Draw attention to organisms found in more than one food chain, e.g. pondweed, guppy. Pupils combine two food chains by writing out the names of these living things once and adding extra arrows to the things that eat them. This creates a food web, e.g. <pre> graph LR pondweed[pond weed] --> tadpole[tadpole] pondweed --> waterbeetle[water beetle] tadpole --> tilapia[tilapia] waterbeetle --> patwa[patwa] </pre>	Large bottle/ glass tank, water, plants and animals from a pond or trench	Did pupils observe feeding relationships in the aquarium? Did pupils show care when setting up and maintaining an aquarium? Were pupils able to complete a food web which had organisms missing?	School Yard Ecology and Environmental Education – Feeding relationships among living things Language Arts - Poetry

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Unit 4: The Environment– Components of the environment and their inter-relations

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Food Webs				<p>An example of a food web is as follows,</p>  <pre> graph TD grass --> cow grass --> deer cow --> human deer --> jaguar </pre>	<p>4. Pupils add other animals such as humans, herons, piranha, and alligators to create a larger food web.</p> <p>5. Pupils copy and complete partially drawn food webs.</p> <p>4. Starting with a given plant, pupils write other food webs.</p> <p>5. Pupils interpret and learn poem, “The old woman who swallowed the fly”</p> <p>I knew an old woman who swallowed a fly. I don’t know why she swallowed a fly, perhaps she’ll die. I know an old woman who swallowed a spider. She swallowed the spider to catch the fly. But I don’t know why she swallowed the fly, perhaps....etc. I know an old woman who swallowed a bird. She swallowed the bird to catch the spider, she swallowed the spider to catch the fly....etc.</p>			

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Humans and the environment	Discuss some of the effects of humans on the environment	Observe and record the effects of humans on the environment.	Demonstrate willingness to improve/preserve the environment.	<p>Humans have many effects on the environment. Humans construct buildings and roads which change how the environment looks. The waste from homes and industry pollutes the environment.</p> <p>We take resources such as trees, sand and minerals from the environment making it harder for some plants and animals to live in these places.</p> <p>Some humans improve the environment by growing plants, helping animals and reducing litter and pollution.</p>	<ol style="list-style-type: none"> 1. Pupils write a short story about what the world would be like if no humans lived here. They discuss if the world would be a better or a worse place without humans. 2. Class discuss the effects they have on the surroundings. They list these as 'Good Effects' and 'Bad Effects'. 3. Working in groups, pupils visit school yard to observe and record the effects of humans on their surrounding. 4. Pupils discuss things they can do to improve the environment. 	Pictures of healthy and unhealthy environments	<p>Were pupils able to list good and bad effects of humans on the environment?</p> <p>Did pupils suggest ways in which they and others can help to improve the environment?</p>	<p>Environmental Education and Health and Family Life Education – Proper care and use of the environment.</p>

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Unit 4: The Environment– Components of the environment and their inter-relations

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Soil	Compare different soils with respect to particle size and water retention.	Observe particle size in soils. Measure and record water retention in soils. Evaluate procedures used to measure water retention.	Appreciate the importance of soil.	Soil is the top layer of the Earth's surface. It is made up of particles of rock and minerals mixed with animal and plant matter. It is important because most plants need soil to grow and all animals rely on plants for their food. Three common soils are clay, sand and loam . Soil particles may vary in size. Clay particles are small, while sand particles are large. Clay holds more water than sand and loam.	1. <i>Which soil has the biggest particles?</i> a) Working in groups, pupils are given samples of different soils to observe and record properties including colour, texture and, importantly, size of particles. Samples should include clay, sand and loam. b) Pupils compare the properties of the different soil samples and arrange them according to size of particles. 3. <i>Which soil holds the most water?</i> a) Pupils are provided with samples of different types of soil, including clay, sand and loam. b) They place each sample in similar containers such as sanitary or polystyrene cups, with holes in the bottom. c) They pour the same amount of water (e.g. one cup, or 50 ml) evenly over each soil sample.	Science Around Us, Book 5, pages 78-80, samples of different types of soil, containers with holes in the bottom, water, cups/ measuring cylinders/ beakers/ jugs, watch/ clock	Were pupils able to make comparisons among the soil types? Were pupils able to state which soil sample held water best?	Mathematics – Graphs. Measuring time and volume Social Studies - Soils

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Unit 4: The Environment– Components of the environment and their inter-relations

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
					<p>d) Collect and measure separately any water that runs out of the bottom of each container over a fixed time period (e.g. ten or twenty minutes). They should display results on a bar graph.</p> <p>e) Pupils conclude which soil sample holds the most water.</p> <p>3. Through class discussion pupils evaluate procedures used in the above investigation to confirm that it was a <i>fair test</i>. Questions may include the following:</p> <p>a) Was the same amount of soil used in each container, and why?</p> <p>b) Why was the same amount of water poured on each sample of soil?</p> <p>c) How would using different amounts of soil/water affect the results?</p> <p>d) Were there any other conditions or factors that would affect the results? Pupils may be able to suggest, -size and number of holes - the rate of pouring the water.</p>			

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Unit 4: The Environment– Components of the environment and their inter-relations

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Soil	Relate the properties of different soils to their uses.	Manipulate equipment in an experiment. Observe the uses of soils.	Appreciate the importance of soils.	<p>The properties of soils, that is, size of particles and the capacity to hold water, make them suitable for specific purposes.</p> <p>Clay soil is useful for the growth of most plants, for making dams and in pottery and ceramics.</p> <p>Sandy soils are useful for growing some plants and in construction of buildings. They also help to improve drainage.</p> <p>Loamy soils are also useful for the growth of some plants and in the construction of roads.</p>	<p>1. In groups, pupils are provided with three different soil samples, e.g. clay, sand and loam (<i>Use the same soils as for the previous lesson so pupils are familiar with their properties.</i>)</p> <p>2. Pupils suggest uses for each soil and give reasons based on the properties of each soil.</p> <p>3. Pupils identify plants, including crops, that grow in clay, sand and loam.</p> <p>3. Where possible they conduct investigations to test their suggestions. For example test which soil would be best for growing plants by planting seeds/seedlings in each soil and observing the growth of the plants.</p>	Soil samples (as for previous lesson),	Were pupils able to relate the properties of soils to their appropriate uses?	<p>Agricultural Science – Properties of soils.</p> <p>Social Studies – Uses of soils</p>

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Unit 5: Weather: Types features and effects of the weather

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Measuring temperature	Give examples of things with high and low temperatures.	Estimate temperature using sense of touch. Measure temperature using a thermometer. Record temperature. Make inferences from measurements.	Demonstrate sharing and cooperation in using equipment. Display care when using instruments	The sun provides us with heat and light. Some things such as fire and boiling water are hot, while ice and snow are cold. Temperature is a measure of the hotness or coldness of things. Hot things have a high temperature and cold things have a low temperature. Temperature is measured by a thermometer and is recorded in degree celsius, or °C.	1. Pupils are provided with four containers of water of different temperature, as follows, A Tap water B Water warmed in the sun C Heated water (not hot enough to burn skin) D Cold water 2. Pupils place one finger at a time into each container. They describe how the water feels. Words used by pupils are written on the board and those which describe temperature (warm, cold, icy, hot, etc.) are discussed. 3. Pupils put a finger of their left hand in the cold water and that of their right hand in the hot water. They leave them there for a minute. Quickly they put both fingers in the ordinary tap water. They say how the water feels. 4. Pupils discuss which containers of water were hotter/colder and are introduced to the term temperature. Pupils state which containers of water had highest/lowest temperatures.	Thermometers, water, containers	Did pupils cooperate in sharing equipment? Were pupils able to compare temperature of water samples by using their fingers, or sense of touch? Did pupils use thermometer properly? Did pupils suggest appropriate uses for water of different temperatures?	Mathematics – Number and measurement. Art and Craft - Drawing

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Unit 5: Weather: Types features and effects of the weather

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
					<p>Pupils use thermometers to measure and record temperature of water samples and their body temperature (measure body temperature by holding thermometer bulb tightly in hand). Note: record temperature in °C</p> <p>6. Based on results and observations pupils answer questions about the water samples, such as,</p> <p>a) Which sample would be best for bathing a baby?</p> <p>b) Which would be best for making Milo, tea or coffee?</p> <p>c) Which would be best for making fruit drink on a hot day?</p> <p>7. Pupils make simple drawing of a thermometer.</p>			

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Unit 5: Weather: Types features and effects of the weather

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Causes and effects of soil erosion	Explain how water and wind affect the soil.	Observe the effects of water and wind on soil. Record and report results of experiments.		<p>Water affects the soil by soaking it and by washing some away. This is done by rain, rivers, and the sea.</p> <p>Wind also affects the soil by blowing away loose soil.</p> <p>These effects are called <i>soil erosion</i>.</p> <p>Erosion reduces the amount and quality of soil.</p> <p>The eroded soil is washed into drains, rivers and other waterways causing them to get blocked up.</p>	<ol style="list-style-type: none"> 1. Pupils visit the schoolyard and local surroundings. They observe dams, streets, pathways, drains, trenches and rivers for signs of the effects of water and wind on the soil. 2. Pupils work in groups of 3 to 6 and perform the following activities, preferably outside the classroom. <ol style="list-style-type: none"> a) <ul style="list-style-type: none"> - Pupils make a small mound of soil - They pour water onto the soil using a watering can or container with holes in the bottom - They observe what happens b) <ul style="list-style-type: none"> - Pupils place some dry soil on a sheet of paper and blow over it - They observe and record what happens - They repeat this using wet soil 3. Pupils discuss the results of the activities in step 2. and relate these to the effects of water and wind on soil in the environment. 	Science Around Us, Book 4, pp. 75-76 spade, shovel, soil, water, watering can or container with holes in the bottom	<p>Were pupils able to observe the effects of water and wind on soil in their local surroundings?</p> <p>Were pupils able to demonstrate the effects of water and wind on soil?</p>	Environmental Education, School Yard Ecology, Social Studies – Causes, effects and prevention of soil erosion

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Unit 5: Weather: Types features and effects of the weather

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Preventing soil erosion	Explain how soil erosion can be prevented.	Manipulate equipment with care. Observe results of experiments on prevention of soil erosion. Interpret results of experiments on prevention of soil erosion.	Display cooperation and safety in using equipment.	Soil erosion can be prevented mainly by plants such as grass, shrubs and trees. The roots of these plants hold the soil together. Plants also reduce the exposure of soil to wind. Dams and proper drainage also reduce soil erosion. Activities such as cutting down trees, replacing vegetation with concrete and overweeding increase soil erosion.	1. Pupils work in small groups to perform the following activity, a) They use two small plastic/tin containers with small holes in the bottom. b) They fill one container with soil and the other with soil with grass or other plants growing on top. c) They place each container on some newspaper which is placed over another container. d) The same quantity of water is poured slowly over each soil sample. e) After 15 to 20 minutes pupils examine the pieces of newspaper and compare the amount of soil trapped in each. f) Pupils draw conclusions about the role of plants in preventing soil erosion. 2. Pupils make suggestion about how they could prevent soil erosion in the school yard/local surroundings. Where possible pupils suggestions are tried out.	Soil, soil with plants such as grass growing on top, plastic or tin containers, newspaper, water, watering can if available	Did pupils show care and cooperation in setting up the experiment? Were pupils able to draw conclusions about the role of plants in preventing soil erosion? Were pupils able to make suggestions about preventing soil erosion in their schoolyard?	Environmental Education – Soil erosion, deforestation, effects of weather on the Earth. School Yard Ecology – Using the schoolyard to demonstrate prevention of soil erosion.

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Unit 6: Materials – Properties and changes in states of matter

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Permanent changes in materials	Describe what happens when permanent changes occur in different materials. Differentiate between temporary and permanent changes.	Observe and record changes in materials. Manipulate equipment safely.	Display care, safety and cooperation in handling materials and equipment.	There are two types of changes that materials can go through. These are temporary (reversible) and permanent (non-reversible). A permanent change happens when the material changes into a different material and cannot return to the original material, or when the change in state of matter is permanent. For example, when paper is burnt it becomes ash and smoke. This cannot be turned back into paper, or when you fry/boil an egg it becomes solid and cannot become liquid again.	1. Recap changes in states of matter, or temporary change, as done in Grade 3. 2. Teacher demonstrates the following with the assistance of pupils: a) Burning a piece of paper or any combustible material b) Placing chalk in vinegar, or acetic acid 3. Class makes observations and discusses results. They should pay attention to how the paper/burnt material looks before and after it is burnt, noting size, colour, texture etc. Pupils suggest where the smoke comes from. They should observe the changes that occur in the chalk and the vinegar over the course of the lesson. 4. Pupils are given other examples of changes in materials and say if they are permanent changes or temporary changes, e.g. boiling an egg, melting candle wax, boiling water, burning kerosene. They should give reasons for their answers.	Paper, acetic acid or vinegar, chalk, matches	Did pupils observe the changes that occurred in the demonstrations? Could pupils give examples of permanent change? Could pupils make comparisons between temporary and permanent change?	Health and Family Life Education - Cooking

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Unit 6: Materials – Properties and changes in states of matter

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Properties of air	Describe some of the properties of air.	Manipulate equipment in investigating properties of air. Demonstrate properties of air.	Display safety and cooperation in using equipment.	Air occupies space and has a volume and a mass. It is a mixture of gases including nitrogen, oxygen, and carbon dioxide. Air is all around us. It takes the shape of its container and expands when heated or when pressure is removed from it.	<p>5. Pupils suggest other examples of permanent change.</p> <p>6. Pupils try out at home demonstrations of permanent change under guidance of parent/guardian. Examples are to put a five dollar coin in a glass of cola, boil an egg or put baking powder in vinegar.</p> <p><i>This topic will take 2 to 4 lessons to complete.</i></p> <p>1. In small groups pupils discuss and list at least five things they know about air.</p> <p>2. Class discusses their ideas under the guidance of the teacher.</p> <p>3. Pupils conduct the following experiments: a) Inflate an empty paper/plastic bag, tie the opening, then try to squash it.</p>	Paper/ plastic bags, plastic bottles, bicycle tube, balloons, balance/ scale, drinking straws, plasticine/ play-dough/ candle	<p>Did pupils list and discuss 5 things they know about air?</p> <p>Were pupils able to observe that air is present all around us?</p>	Technology Education – Properties of air.

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
		<p>Observe and record the properties of air.</p> <p>Predict results of experiments</p>		<p>The volume of air decreases when under pressure or when cooled.</p> <p>The air pushes on everything around us. This force is called air pressure or atmospheric pressure and it pushes in all directions.</p>	<p>b)They try to squash a plastic bottle with the cap off then with the cap on.</p> <p>c)Pupils inflate a bicycle tube, observing changes in shape, size and firmness.</p> <p>d)Pupils discuss their observations and relate them to the fact that air occupies space.</p> <p>3. Pupils predict which is heavier, a deflated balloon or an inflated balloon of the same size. They then use a balance/scale to find out which is heavier.</p> <p>b) Pupils discuss observations and relate to the fact that air has mass.</p> <p>5.a) Put a straw through the hole in the top of a plastic drink bottle.</p> <ul style="list-style-type: none"> - Seal hole around the straw with plasticine/ play-do/candle wax. - Pour water into the bottle so that when you put the straw in, the end of the straw goes below the water. - Screw the cap on tightly. <p>Pupils blow hard into the straw then move away quickly.</p>	wax, water, drink, ice	<p>Could pupils demonstrate that air has mass?</p> <p>Were pupils able to explain the results and observations of experiments?</p> <p>Did pupils handle equipment with care and safety?</p> <p>Were pupils able to suggest uses and applications for the properties of air?</p>	

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Topic	Objective			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
					<p>b) Set up equipment as in 5. a) but do not put water in the bottle. Pour a few drops of water into the straw so the water sticks in the straw. Pupils hold bottle gently with both hands for about a minute. (This heats up the air inside the bottle and forces the water out of the straw.)</p> <p>6.</p> <p>a) Warm the air in a plastic bottle using the sun or a flame. Screw the cap on tightly.</p> <p>Put the bottle in a freezer/box of ice/cool place for a few minutes. Remove from the cold and observe what happens.</p> <p>b) Pupils put two straws in their mouth and suck drink through them. Keeping both straws in their mouth they put one straw outside the cup and try to suck the drink again.</p> <p>7. Class discuss demonstrations and experiments. They suggest the uses or applications of these properties of air, e.g. pumped-up tyres of bicycles and vehicles make the ride more comfortable.</p>			

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Unit 6: Materials – Properties and changes in states of matter

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Prop- erties of water	Describe some of the properties of water	Manip- ulate equip- ment to demon- strate prop- erties of water. Observe demon- strations and experi- ments of prop- erties of water. Make predic- tions and infer- ences. Record observ- ations.	Display safety and co- operation in using equipment.	Water is a liquid. It has a mass and volume and takes the shape of its container. Water has the ability to flow, exerts pressure and has a surface tension. Water pressure is the force that water puts on objects in the water. Surface tension is like a skin on the surface of the water that tends to stop the water from flowing and allows some things to 'float' on the surface. For example when water falls on a surface it forms droplets and does not flow or spread out.	<i>This topic may take 2 to 4 lessons.</i> 1. In small groups pupils list at least five things they know about water. 2. Class discusses these with input from the teacher. 3. Pupils are provided with water and various containers. They investigate and demonstrate how they can change the shape that the water takes. 4. Pupils compare the mass of water with the mass of other materials. They place the materials in order of mass, starting with the heaviest, and state which things are heavier and lighter than water. <i>Note: For the comparison of mass to be fair the same volume of each material must be used, e.g. water may be heavier than vegetable oil but if pupils use half a cup of water and a whole cup of oil then the oil will obviously appear heavier. By careful questioning and demonstration, guide pupils to realise that the same, or at least similar, amounts of each material needs to be weighed.</i>	Containers of various shapes and sizes, water, matches, plastic bottles, beakers/ cups, modelling clay/play-dough/ plasticine, nail, needles and pins, balance/ scales	Did pupils state five things they know about water? Did pupils conduct demonstrations of properties of water? Did pupils make observations? Were pupils able to discuss their results and observations?	Math- ematics – measure- ments (mass), shape Technology Education – Properties of water. Art and Craft – Making equipment

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
					<p>5. The following experiments demonstrate water pressure</p> <p>a) Fill plastic bottle with water. Put a few match heads in bottle. Screw cap on tightly. Pupils squeeze the bottle hard and observe what happens.</p> <p><i>Note: Increased pressure in the water should cause the match heads to sink.</i></p> <p>b) Make 3 small holes with a nail in a large plastic bottle/container – one above the other and about 5 cm apart.</p> <p>Block up the holes with play-dough/plasticine/tape.</p> <p>Fill bottle with water. Pupils predict what will happen when the material is removed from the holes.</p> <p>6. The following experiments demonstrate surface tension.</p> <p>a) Pupils place a few drops of water onto any surface. They observe the drops. They record their observations, preferably using drawings. Attention should be paid to the shape of the drops.</p>			

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
					<p>Pupils put a drop of soapy water/detergent/a few grains of soap powder onto the drops of water and observe what happens.</p> <p>b) Pupils are provided with a container of water. They try to balance pins/needles on the surface of the water (<i>Note: the pin does not float, rather it balances or rests on the water surface</i>).</p> <p>c) Pupils investigate which is the largest pin/needle they can balance on the water. They find other objects which will balance on the surface in the same way, e.g. razor blade</p> <p><i>Note: Adding a drop of soapy water/detergent/a few grains of soap powder breaks the surface tension and the pins will sink.</i></p> <p>7. After each experiment or demonstration class discusses observations and results.</p>			

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Unit 7: Earth and Space – Components of the solar system and their inter-relations

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
The solar system	Demonstrate that the sun is at the centre of the solar system.	Communicate the make-up of the solar system through models and posters. Draw a diagram of the solar system.	Appreciate that the Earth represents a small part of the solar system. Display co-operation in finding out information on the solar system.	The sun is the centre of the solar system. There are nine known planets which orbit (travel around) the sun. The planets in order of distance away from the sun are, Mercury Venus Earth Mars Jupiter Saturn Uranus Neptune Pluto Mercury being nearest to the sun.	<i>This topic may take about three lessons</i> 1. Pupils observe model/diagram of the solar system including orbits of each planet noting the planets and their position in relation to the sun. 2. Pupils demonstrate the make-up of the solar system as seen in model/diagram a) One pupil stands in the centre to represent the sun. Nine other pupils, each representing a different planet, take up positions around the 'sun'. Each pupil wears a label of a different planet. b) Each of the nine pupils turns around slowly, or rotates. d) Pupils continue to rotate and move (revolve) around the 'sun' in elliptical, or oval, paths. e) Each pupil marks with chalk on the floor the path they travelled around the 'sun'. 3. Pupils draw diagram of the solar system including orbits of the planets. 4. a) Class is divided into 10 groups, one group is allocated the sun, and each of the other groups is allocated a different planet.	Orbit Orrery – model of the solar system, chalk, Access to books, magazines I.T. resources, cardboard, markers	Could pupils recall the position of the planets in relation to the sun and each other? Did pupils demonstrate the make-up of the solar system? Did each pupil contribute to group work? Was information presented meaningfully by each group?	Math - ematics – Order of size Art – Drawing and colouring Social Studies – Composition of the solar system

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Unit 7: Earth and Space– Components of the solar system and their inter-relations

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
The solar system					<p>b) Each group finds out about five basic facts such as relative size, position, colour and presence of moons of the sun or allotted planet.</p> <p>c) Each group reports to class. Findings are discussed.</p> <p>5. Each group makes a drawing of their planet (or the sun). They include their findings with the drawing. These are displayed in the classroom in the correct order.</p> <p>7. Pupils prepare/use memory aids to recall the order of the planets. For examples see Science Around Us, Book 3, Page.74.</p>			

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Unit 8: Energy– Forms of energy, their sources and effects

Topic	Objective			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Sources of heat	State sources of heat.	Observe sources of heat. Plan simple means of assessing the strength of a source of heat. Interpret results of experiments.	Display care and safety in using sources of heat.	Heat is a form of energy. We get heat primarily from the <i>sun</i> . Other sources of heat are fire (flame), friction, and electrical devices such as irons and light bulbs. Care must be taken when using heat so as to prevent burns, fires and any other form of damage.	1. Pupils recap main forms of energy, noting that heat is one form of energy. 2. a) Pupils rub their hands together, first slowly, then faster. They discuss their observations. b) They rub their hands on different surfaces and report which surface makes their hands feel hotter. 3. Pupils work in small groups and identify sources of heat. They share and discuss these sources. 4. a) In groups pupils devise a way of assessing the strength of a heat source. <i>Note:</i> One way of doing this is to measure how far away from the heat you must go before you stop feeling it with your hands. <i>The pupils should be encouraged to think of their own ideas.</i> b) Pupils are provided with a heat source (e.g. light bulb, candle, kerosene lamp or alcohol burner) to measure the strength of its heat using their suggested method.	Sources of heat, e.g. candle, light bulb, kerosene lamp, alcohol burner.	Did pupils recall that heat is a form of energy? Were pupils able to identify at least five sources of heat? Did pupils find out which surfaces produced more heat when rubbed? Did pupils devise methods of assessing sources of heat?	Mathematics – Non-standard measurements Home Economics/ Social Studies – Sources of heat

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Unit 8: Energy– Forms of energy, their sources and effects

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Uses of heat	State some uses of heat.	Communicate through posters ways to conserve heat.	Appreciate the wide variety in the uses of heat. Justify the need to conserve heat.	Heat helps us to do things such as cooking and ironing. The sun's heat keeps living things and the environment warm. Plants use heat from the sun to help make food.	<p>c) Pupils are provided with a second source of heat to find out which of the two is stronger. <i>Note:</i> Pupils must not touch heat sources 6.Homework: Pupils identify sources of heat at home.</p> <ol style="list-style-type: none"> 1. Pupils work in small groups and identify uses of heat. Class shares and discusses these uses. 2. In their groups, pupils discuss and identify ways by which heat can be conserved or used wisely. 3. Each pupil designs in his/her book a poster on conservation of heat. 4. The best design is transferred onto cardboard and displayed in the classroom/school. 5. Pupils share with family members ways of conserving heat. 	Card-board, markers	<p>Did pupils identify the wide uses of heat?</p> <p>Did pupils identify at least three ways to conserve heat?</p> <p>Were pupils eager to share with family members ways to conserve heat?</p>	<p>Home Economics/ Social Studies/ Technology Education/ Environmental Education – Uses and conservation of heat.</p> <p>Art – designing posters</p>

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Unit 8: Energy– Forms of energy, their sources and effects

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
How heat travels – conductors and insulators	Discuss the ways by which heat travels.	<p>Demonstrate the ways by which heat travels.</p> <p>Observe how heat travels in different materials.</p> <p>Predict which materials are good conductors and which are good insulators.</p> <p>Interpret results of experiments on heat transfer.</p>	<p>Display care and safety when using equipment and heat.</p>	<p>Heat travels through solids by conduction. For example, when a spoon is placed in hot water.</p> <p>Heat travels through liquids and gases by convection. For example, the air above a candle flame feels warm because hot air has moved upward from around the flame.</p> <p>Heat travels across space by radiation. For example, the heat which travels from the sun to the earth, and heat which is felt away from the sides of a hot pot.</p>	<p><i>This topic should take about four lessons.</i></p> <p>1. Teacher demonstration with help from pupils. Heat some water in a tin. With caution, pupils place their hands near to the outside of the tin, then above the tin.</p> <p>2. Pupils describe observations and explain how the heat they felt travelled from the heat source, that is the flame.</p> <p>3. Pupils work in small groups.</p> <p>a) Each group is provided with one cup of hot water. (<i>Note: Polystyrene cups are preferred. Water should be hot but not to scald or burn</i>)</p> <p>b) Pupils place one end of different objects (see Materials column) in the water at the same time.</p> <p>c) Pupils predict which objects will feel hotter. They feel the exposed end of the objects to find which are hot.</p> <p>From the results, pupils say which materials are good conductors/insulators of heat.</p>	<p>Water, heat source such as candles, alcohol burners, or kerosene lamps, tin container, Water soluble coloured substance such as food dye or drink mixture, glass jar (e.g. jam jar), cups (polystyrene or ceramic), hot water, objects to test in hot water such as, metal spoons</p>	<p>Did pupils observe demonstrations of conduction, convection and radiation?</p> <p>Were pupils able to suggest how heat travels?</p> <p>Did pupils predict which materials are good conductors of heat?</p> <p>Were pupils able to find out which materials are good conductors/insulators from experiments?</p>	<p>Technology Education – Heat transfer</p>

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Unit 8: Energy– Forms of energy, their sources and effects

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
					<p>4. Demonstration by teacher.</p> <p>a) Fill glass jar with water and allow it to settle</p> <p>b) Carefully place a few drops of liquid food dye or a few crystals of food dye/drink in the bottom of the glass jar of water, near to the side</p> <p>c) Heat the glass jar with a small heat source such as a candle below the coloured substance.</p> <p>d) Pupils discuss observations.</p> <p>e) They state other examples of convection in the home and wider environment.</p> <p>5. a) Pupils place hands near to the outside of a container of heated water, <i>without touching it</i>, as in step 1.</p> <p>b) They describe and discuss what they observe. <i>(Note: This transfer of heat is by radiation.)</i></p> <p>c) They suggest other examples of heat radiation, such as heat from the sun</p>	plastic spoons, pencils, straws, long nails, rubber bands		

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Topic	Objective			Content	Method/Strategies	Materials	Evaluation	Integration
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Applications of how heat travels		<p>Plan a method to heat water without using a flame or electricity.</p> <p>Manipulate equipment to heat water.</p> <p>Evaluate chosen method and suggest improvements.</p>	<p>Develop the willingness to share ideas.</p> <p>Use imagination and initiative.</p>	<p>This topic relies on topics from the previous three topics:</p> <p>Sources of heat, Uses of heat, and How heat travels – conductors and insulators.</p>	<ol style="list-style-type: none"> 1. Recap lessons on sources and uses of heat, and how heat travels. 2. Pupils work in small groups. They are assigned the task of heating a given amount of water to as high a temperature as possible without using flames or electricity. 3. Pupils discuss and plan what they will do to heat the water using readily available sources of heat. <i>(They should be encouraged to use knowledge gained from previous lessons, teacher helps with suggestions.)</i> 4. Each group is provided with the <i>same amount of water</i> to heat within <i>the same time</i>. 5. After the allocated time each group measures the temperature of water. Teacher gives assistance. Results are recorded. 6. Pupils describe what they did and suggest ways to improve their method. <p><i>Note: To heat water pupils could use the sun, their body heat, friction,</i></p>	<p>Water, cups of the same size, variety of other containers e.g. plastic/glass bottles, mugs, jugs, trays, bowls and saucers, Paper and cloth of different colours and types, thermometer, and other material as required by pupils.</p>	<p>Were pupils able to devise means of heating water?</p> <p>Were pupils willing to share ideas?</p> <p>Did pupils make suggestions to improve their method?</p>	<p>Home Economics/ Technology Education – Using and conserving heat</p>

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Simple electrical circuits –	Explain electricity flows in a circuit.	Manipulate equipment to demonstrate the flow of electricity in a simple circuit. Observe features of a simple circuit. Draw and label a simple electrical circuit.	Display care and safety in handling equipment and dealing with electricity.	Electricity is a form of energy. It flows in a path called a circuit . In a circuit the electricity is provided by a battery or generator . The electricity flows in the wires and is used by light bulbs, radios, TVs, irons and other appliances . Electricity only flows in a <i>complete</i> circuit, thus any gap would prevent its flow. Switches open and close gaps in a circuit.	<i>different insulating materials and containers, or any other means which are readily available. Give suggestions only if pupils have difficulty in planning method.</i> 1. Recap the forms of energy and identify electricity as one of these. 2. Pupils investigate how to get a bulb to light. a) Pupils work in small groups. Each group is provided with the following: One new pen torch (1.5 V dry cell) battery, Two pieces of insulated wire One, 1.5 V light bulb About 10 cm of insulation tape b) Using these materials pupils must get the bulb to light. c) They share what they did and what they observed with the class. 7. Pupils paste/tape parts of the circuit onto stiff cardboard, giving it a title and labelling the parts. <i>This can be stored for future use.</i>	1.5 V dry cell battery (pen torch), insulated wire, from unused radios, TVs, and telephones, 1.5 V light bulb, e.g. from a torch light, insulation tape	Did pupils remember the common forms of energy? Did pupils get the bulb to light? Did pupils realise that a complete circuit is necessary to get the bulb to light? Were pupils able to make a simple drawing of the materials?	Technology Education – The flow of electricity

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Electrical circuits – conductors and insulators	Identify some common electrical conductors and insulators.	Manipulate simple equipment. Observe the results of tests carried out.	Display care and safety in dealing with electricity.	Substances that allow electricity to flow through them are called conductors ; those that do not are called insulators, or non-conductors. Examples of good conductors are copper, steel, iron, graphite and water. Examples of insulators are rubber, plastic and wood.	8. They make a simple drawing of the layout of the materials making up the electrical circuit and label the main parts. 1. Working in small groups, pupils use the circuits set up in the previous lesson. They secure it to a piece of cardboard/desktop to prevent parts moving easily 2. They make a gap in the circuit. Into this gap they place a metal paper clip and observe what happens (<i>Note: The paper clip completes the circuit allowing electricity to flow and light the bulb.</i>) 3. Class discusses observations, then repeat the activity using a piece of rubber band.	Simple circuits from previous lesson (each group may need at least two batteries arranged in series),	Were pupils able to set up their circuits properly to test the materials? Were pupils able to classify materials as conductors or insulators?	Technology Education – Electrical conductors and insulators

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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		<p>Interpret results to conclude which materials are conductors and insulators</p> <p>Classify materials as conductors and insulators</p>			<p>4.Each group is provided with a variety of objects/materials. They predict which will allow the bulb to light.</p> <p>5.In turn , they place the objects in the circuit and observe which allows the bulb to light 6.Pupils draw two large circles in their books. One headed ‘Conductors’ the other ‘Insulators. They put the materials into the appropriate circle, then write the names of these materials in the appropriate circle.</p> <p>7.Pupils suggest other conductors and insulators and their practical uses.</p>	<p>Variety of materials/ objects, e.g. metal paper clip, rubber band, string, small nail, match stick, plastic, glass, hair clip, hair, cloth, paper, metals.</p>	<p>Were pupils able to suggest some uses of conductors and insulators?</p>	

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Unit 9: Forces – Types of forces and their effects

Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Mass	Compare the masses of different objects.	Estimate and predict the mass of different objects. Use instruments to measure mass. Record mass of objects in standard units.		Some things are heavy , e.g. a cow or car. Some things are light , e.g. a feather or pen. Heavier things have more mass , e.g. a mango has more mass than a feather. Mass is measured in grams (g) or kilograms (kg) 1 kilogram = 1000 grams 1 kg = 1000 g Mass is measured by scales, balances, spring balances, or even-arm balances.	1. Pupils work in small groups and are provided with a variety of objects. They hold the objects in their hands and say which are heavy and which are light. They arrange them starting with the heaviest. 2. In small groups or as demonstration: a) Fill one container with sand. Half fill a container of the same size with beads/peas b) Pupils predict which is heavier c) Using standard or improvised scales, compare the mass of the containers. d) Remove or add sand until the containers have the same mass. e) Pupils observe the difference in the size of the spaces between the grains of sand and between the beads/peas. They discuss observations. 3. Pupils make a simple drawing of the measuring equipment which they used.	Scales/ balances/ spring balances (pupils may bring these from home or make improvised scales from a coat hanger), set of masses (10 g – 1000 g), Beads/ peas, sand, feathers/ foam, rice, lead, aluminium iron, fruits, vegetables books, etc.	Were pupils able to estimate which objects were heavy and which were light? Were pupils able to estimate the mass of different objects using standard units? Were pupils able to measure the mass of the different objects?	Mathematics/ Home Economics – Measuring mass Art and Craft - Drawing

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
The effects of gravity	Discuss the effects of gravity.	Observe the effects of gravity.		<p>A ball thrown into the air falls back to the Earth. Fruits fall to the ground. This is because the Earth pulls, or attracts, everything to it. This force of attraction is called gravity.</p>	<p><i>Note: Pupils should measure and record in g/kg. See Notes for Teachers.</i></p> <p>8. At home, pupils read labels on boxes/packages and hold grocery items of fixed mass, e.g. ½ kg of salt, 1 kg of sugar, to help in better estimation of masses.</p> <p>1. Pupils work in small groups and carry out the following activities: a) Throw a small object, e.g. eraser or sharpener and catch it in their hands. b) Slide a small object off the table onto the floor. 2. Pupils discuss and explain their observations. They are introduced to gravity as something which makes objects fall towards the ground. 3. Pupils identify other situations which demonstrate the effects of gravity.</p>	Simple classroom objects, e.g. eraser, sharpener or book	<p>Were pupils able to explain why objects fall towards the ground?</p> <p>Did pupils give other examples of the effects of gravity?</p>	Physical Education – Sports and games, such as those involving jumping and throwing.

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
	Knowledge	Skills	Attitude					
Sinking and floating	Identify objects which float and objects which sink in water. Relate the mass and the shape of objects to floating and sinking.	Predict which objects will float and which will sink. Observe experiments on floating and sinking. Interpret results of experiments and draw conclusions.	Display careful and wise use of water.	Some objects float in water, e.g. oil, feathers and wood, while some objects sink , e.g. coins and stones. Things that are light for their size usually float on water. Things which are heavy for their size usually sink. Generally the larger the area in contact with the water, the better the object will float. For example, a flat piece of aluminium foil will float, but it will sink if folded tightly into a ball.	Pupils work in small groups and carry out the following investigations. 1. a) Pupils are given a variety of everyday objects. They predict which will float in water and which will sink. b) They place objects in water to find out which float and which sink. c) Class discuss results and observations. d) Homework: Pupils test other items at home to find out whether they float or sink. 2.a) Put objects of similar size but different mass, e.g. cherry and marble, one empty drink bottle and one full of sand, in water and observe what happens. f) They explain their observations. 3. a) Pupils use aluminium foil/plasticine/Play-dough and investigate how changing their shape effects floating or sinking.	Variety of everyday objects, e.g. coins, paper, fruit and vegetables pebbles, marbles, nails and pencils, empty drink bottles, sand, aluminium foil, plasticine/Play-dough, water, large bowls or buckets, styrofoam	Were pupils able to predict which things float and which sink? Did pupils identify at home items which float or sink? Were pupils able to relate the size and mass of objects to their floating or sinking? Were pupils able to relate the shape of objects to their floating or sinking?	Technology Education – floating and sinking Mathematics - Sets

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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Simple machines	State instances where pulleys and wheels are used.	<p>Make pulleys and wheels from everyday materials.</p> <p>Use and assess the effects of pulleys and wheels.</p>	<p>Display patience and perseverance in making improvised equipment.</p> <p>Use imagination when making pulleys and wheels.</p>	<p>Machines help us to do things such as lifting and moving objects from one place to another.</p> <p>Two simple machines are the pulley and the wheel.</p> <p>Pulleys are used on clothes lines, flag poles and draglines. Wheels are found on bicycles, carts and koker winches.</p>	<p>b) Pupils shape foil/plasticine /Play-dough into a ‘boat’ and place it in water</p> <p>c) They find out the maximum number of coins/masses the boat can hold.</p> <p>d) They modify the shape of the boat to try to increase the number of coins/masses it can hold.</p> <p>g) Pupils relate the shape of the foil/plasticine/Play-dough to its ability to float.</p> <p style="text-align: center;">Pulleys</p> <p>1. Pupils work in groups of 2 or 3 and make a pulley using a cotton reel, wire and string (see appendix)</p> <p>2. Pupils use their pulleys to lift objects.</p> <p>3. They describe what they did and what they observed.</p> <p>4. Pupils list other places they have seen pulleys being used.</p> <p style="text-align: center;">Wheels</p> <p>1. Pupils identify places where they have seen wheels being used.</p> <p>2. They observe wheels in use by handling/using a variety of items</p>	<p>Cotton reels, wire, string, nails, matches, discs cut from carton boxes or plastic containers match boxes,</p>	<p>Were pupils able to make pulleys and wheels?</p> <p>Were the pulleys and wheels effective?</p> <p>Did pupils give instances where pulleys and wheels are used?</p>	<p>Technology education – Uses of pulleys and wheels</p> <p>Art and Craft – Making models</p>

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Topic	Objectives			Content	Method/Strategies	Materials	Evaluation	Integration
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				See Science Around Us, Book 4, Pp. 69-71.	(e.g. toy cars, bicycles) paying attention to how the wheel works. 3. In groups of 2 or 3 pupils make wheels out of thick cardboard/plastic discs, using a nail, match or pencil as the axle 4. They attach a 'body' (e.g. match box, toilet paper tube or cardboard box) to their wheels to make a 'car' or cart 5. Using the car/cart that they made, or a toy car, pupils investigate several cars to see which is the best. <i>Note: they could release each car down a ramp and measure how far they travel.</i> 6. Pupils examine the wheels of the cars they used and suggest why some travel further than others.	Toilet paper tube, tape, plasticine, objects of varied mass		Mathematics – Measuring